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The purpose of this instruction is to provide consistent direction and requirements for investment planning performed at AEDC.   It is also the intent of this coordinated document to integrate the work of all functional and product oriented organizations to seamlessly deliver required Research, Development, Test and Evaluation (RDT&E) capabilities as efficiently and effectively as possible. This instruction is applicable to all government personnel who propose and plan RDT&E projects at AEDC.   These investment projects may repair, replace, improve or modernize AEDC systems and assets that deliver mission test capabilities.   The investment planning phase includes both preplanning and planning as shown in the AEDC system engineering process flowchart.  Planning is followed by the Design and Delivery Phase, which is described in AEDCI 63-200.   AEDC Plans and Programs (AEDC/XP) and AEDC Financial Management (AEDC/FM) organizations own the prioritization and budgeting processes; however, investment planners must be cognizant of policies and procedures for programming and budgeting and plan wisely for these required activities. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 36-363, Management of Records, and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) located at **https://www.my.af.mil/afrims/afrims/afrims/rims.cfm**.   Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF IMT 847, *Recommendation for Change of Publication;* route AF IMT 847 through the appropriate functional chain of command.

*SUMMARY OF CHANGES*

**This document is substantially revised and must be completely reviewed.**  This instruction has been updated to refer to the current Arnold Engineering and Development Center (AEDC) organizational structure.  All sections have been updated to more accurately reflect the current investment planning process. Abbreviations, acronyms and terms. See AEDC Acronyms, System Engineering and Configuration Management Terms and Definitions accessible through the AEDC intranet homepage.

**1.  Roles and Responsibility**

1.1.  The Director, 704 Test Systems Group (704th TESG) is responsible to the AEDC Commander (AEDC/CC) for RDT&E investment planning and execution.  The director will coordinate investment planning efforts with the AEDC Capability Review Board (CRB) so they can provide corporate guidance for capabilities planning and make resource allocation decisions.

1.2.  The Director, 650 Test Systems Squadron (650 TESS) is responsible for:

1.2.1.  RDT&E investment program and project planning to include policy development and implementation.

1.2.2.  Executing the investment planning process for all new start projects.

1.2.3.  Developing AEDC support contract performance work statements (PWS) and coordinate with the AEDC support contractor to assure the RDT&E investment planning process defined herein is executed in accordance with the PWS, this instruction and contractor procedures.

1.2.4.  Review and approval of the investment planning project team's planning project plan.  The approval of the plan is the authorization to begin planning.

1.2.5.  Approval of all investment planning documentation constituting a project planning baseline.  Approval indicates appropriate review and validation has taken place and that AEDC is ready to begin design and execution of the project.

1.2.6.  Coordination with the Commander, 704 Civil Engineering Squadron (704 CES) for projects that will involve civil engineering programming or MILCON support and with the Director, 704th Communication Squadron (704 CS) on projects requiring coordination with computer or communications systems processes.

1.2.7.  Soliciting planning projects from capability owners.

1.3.  The Director, 651 Test Systems Squadron (651 TESS) is responsible for:

1.3.1.  Review, evaluation and acceptance of draft RDT&E investment comprehensive program management plans (CPMP)

1.3.2.  Assuring changes are effectively managed during project execution so that project plans and requirements documents, baselined at the completion of planning, are maintained complete, current and accurate.  Project change management requirements are identified in AEDCI 63-200.

1.4. Government investment program managers assigned to the 704 TESG are responsible for:

1.4.1. Assuring compliance with this AEDC Instruction when planning and AEDCI 63-200 when executing RDT&E investment projects.

1.4.2. Working closely with government and contractor investment project management team members to develop project needs, plans, and a Systems Engineering Approach (SEA) including requirements documentation.  The SEA should include completion of capabilities analysis and risk assessment or reference to analysis performed by system or asset owners.  When investment projects require military construction (MILCON) programming, a DD Form 1391 will be completed and submitted to 704 Mission Support Group (704 MSG).

1.4.3. Reviewing and grading all investment project plans, including all documents that are part of the plan. See **Attachment 2** for project management checklist.

1.4.4. Measuring the performance of their projects with regards to compliance with this instruction.

1.5. Capability Owners are responsible for:

1.5.1. Identifying needs, capability gaps, and other work that may lead to investment projects.

1.5.2. Facilitating development of capability roadmaps and investment project needs that will be developed into capability requirements that are recorded in investment needs and project plans.

1.5.3. Participation in requirements review boards, system requirements reviews and meetings to develop or approve project SEAs or requirements in accordance with AEDC Standard SE-1.

1.5.4. Review and approval of investment project plans, including technical requirements and related documentation, as required by the investment project team.  Approval indicates appropriate review and requirements validation has taken place and that AEDC is ready to begin design and execution of the project.

1.5.5. Working with their AEDC support contractor or government counterparts to develop, record, review, validate, and select needs to deliver AEDC capabilities.

1.5.6. Working with their AEDC support contractor counterparts to develop, record, review, validate, and select Project Plans including a SEA for execution (including design).

1.5.7. Playing a key role in the investment project identification and decision making process as defined in AEDCI 90-700, *Capability Analysis and Risk Assessment*.  While government program managers in 704 TESG will lead planning and execution, the capability owners must assure complete, current and accurate need and plan information is reflected in the Integrated Requirements List that will be presented to the CRB for AEDC funding decisions.

1.5.8. Reviewing and approving changes to baseline documents using approved center change agreement process identified in AEDCI 63-200 and the AEDC support contract.

1.5.9. Validating and approving (as required by investment planning team or management) requirement documents.

1.5.10. Participating in configuration change boards (CCBs) as either the review or approval authority for performance-oriented configuration changes to RDT&E system assets.

1.6. The Director, Plans and Programs (AEDC/XP), is responsible to the AEDC/CC for management of plans and programs affecting the Center's current and future missions and for capabilities assessment and planning. XP identifies future test capability requirements, tracks existing test capabilities, and defines gaps between future requirements and existing test capabilities. AEDC/XP is responsible for development of strategies to acquire new and improved test capabilities.

1.6.1. The Chief, Capabilities Integration (AEDC/XPR), is the Center lead for future capability planning and participation in AF and AFMC long-term planning. AEDC/XPR is responsible for:

1.6.1.1. Providing future test capability planning, concept development and technology needs, validation of requirements, spiral development plans of identified technical shortfalls, concept design analysis, assessment of solution alternatives, and higher headquarters planning coordination.

1.6.1.2. Developing strategies to transition new test capabilities, modeling and simulation tools, as well as instrumentation, into all test assets, and for programming solutions through the Center's POM and Major Range and Test Facilities Base (MRTFB) programs.

1.6.1.3. Internal and external advocacy of future investment plans to accomplish the AEDC strategic plan, including crafting and advocating the AEDC positions in OSD's Central T&E Investment Program (CTEIP) process and AF's Test Investment Planning and Programming (TIPP) process.

1.6.1.4. Development of processes that facilitate future test capabilities and business development.

1.6.1.5. Supporting 704 TESG source selection efforts for new or improved capabilities and facilities.

1.6.2. The Chief, Strategic Planning and Transformation (XPT), is responsible for:

1.6.2.1. Leading the strategic planning process, including prioritization of Center capabilities, capability gaps, and associated initiatives, as well as developing and publishing the AEDC strategic plan.

1.6.2.2. Leading the Center Program Objective Memorandum (POM) process in accordance with HQ AFMC guidance and consistent with the strategic plan.

1.6.2.3. Coordinating Planning, Programming, Budgeting, and Execution (PPBE) process inputs to HQ AFMC.

1.6.2.4. Leading budget-year planning activities through the Capability Analysis and Risk Assessment (CARA) process, which encompasses requirements validation and prioritization, resource allocation, development of the Integrated Requirements List

and Unfunded Requirements List, and development of the annual workload (initial and revisions) for the AEDC's operating contract.

1.7. The Commander, 704 CES shall assure coordination with 704 TESG for projects that require civil engineering programming and MILCON support.

1.8. The government Mission Area Manager and/or the Capability Owner (TG) and Asset Owner (MXG, MSG) proposing a need shall:

1.8.1. Validate needs, prioritize needs and submit needs to the 704 TESG for planning.

1.8.2. Participate in 704 TESG-managed project planning and approve requirements documentation and project plans prior to project execution. Government managers shall designate experienced and knowledgeable personnel who have the authority to make decisions as RDT&E investment project team members.

## 2. Procedures.

2.1. Step 1, Needs Development

2.1.1. Mission need. RDT&E investment planning process begins with a need to improve, modernize, repair or replace systems or assets or portions thereof that deliver test mission capability for AEDC's aerospace customers. Government program managers and capability owners work closely with mission support contractor personnel to develop a need and record these needs in the contractor's investment planning system.

2.1.2. Need Refinement. A submitted need is further developed to include: description or statement of need, justification, impact, required completion date, detailed planning cost, rough order of magnitude (ROM) execution cost that includes operations and maintenance costs, identification of proponent and mission area, and government review and approval/validation of planning documents. An Alternative Systems Review (ASR) is completed during need refinement to assure a complete and multi-functional review of alternative concepts that may be considered in meeting an identified need.

2.1.3. System Architect Validation. The contractor system architect reviews, evaluates and validates submitted needs to ensure the need is mapped to the affected AEDC capability and a baseline concept of how to satisfy the need is recommended: 1) repair, modify or upgrade existing system; 2) acquire new system; 3) use alternate system; or 4) not satisfy the need. High-level engineering and risk assessments are conducted and a ROM cost estimate is prepared, potential funding source(s) are identified and a need date established.

2.1.4. Coordinate Need. Once the need is validated it is sent for coordination with Environmental, Safety, Security, Fire, Siting, Information Assurance, and Civil Engineering to ensure need development is compliant with their requirements.

2.1.5. Validate And Approve Need. Government and contractor personnel work together to ensure that a concise, clear, and valid need is recorded. Responsible government capability owners will approve and validate needs in their capability area. Approval of the need means that the need is valid. (i.e. there is a compelling reason and requirement for the need that is linked to AEDC mission objectives.) When a need is validated, it becomes an AEDC Capability Requirement. Approval and validation will be performed and recorded in the contractor's investment planning system.

2.1.6. Release Capability Requirement.  Once need is validated and approved in the contractor's investment planning system the responsible capability owner may approve the need and submit the capability requirement to AEDC/XP for addition to the Integrated Requirements List (IRL) or for emergency out-of-cycle requests, the Unfunded Requirements List (URL).  This is the hand-off to the AEDC/XP managed CARA process documented in AEDCI 90-700.  Capability Requirements that have been released for project planning will be tagged with an expiration date, not to exceed 2 years from date of original approval.  The objective is to assure these documented requirements are maintained complete, current, and accurate while on an IRL or URL and awaiting funding.

2.2.  Step 2, Investment Planning

2.2.1. Select Projects For Planning.   Upon favorable decision to proceed and fund project planning, the responsible capability owner will notify 651 TESS/CL that project has been selected for planning.  A project number will be assigned to the capability requirement or investment project and a 704th TESG program manager will be assigned to plan the project.

2.2.2. Develop Planning Project Plan and Assign Planning Team.   The government program manager will work with the mission support contractor to develop the project planning team including government and contractor personnel who include the user, customer, operators, maintainers and personnel from cross-organizational and multi-functional organizations.  Project plans include all multi-year work to complete the project.  The Project Planning Team performing planning shall develop a financial plan, schedule, acquisition strategy, and risk assessment.

2.2.3. Project Plan Approval.  The 650 TESS/CL, or designee will review and approve planning project plan to ensure it is complete and funds have been identified for planning.

2.2.4. Review of User Functional Requirements (CONOPS).  The review of functional requirements is conducted to ensure that requirements agree with the users' needs and expectations.  The review ensures that the preferred system alternative is cost effective, affordable, operationally effective and suitable, and can be developed to provide a timely solution to a need at an acceptable level of risk.  This process requires dialogue between the program management team, the user, and industry.  The primary objective is to agree on the requirements, costs, schedule, technical approach, and program or project strategy with a high confidence of success.

2.2.5. Develop SEA. After the functional review the project planning team will convene a meeting of the most knowledgeable and experienced personnel available who can help develop an SEA.  The documented SEA will be recorded in the contractor's investment planning system as an attachment to the project plan.  The purpose of the SEA is to 1) identify the current configuration of the project's scope, 2) determine the optimum concept or alternatives from an alternatives analysis, 3) reduce technical risk to a manageable level, 4) create a technical baseline from which to perform cost and schedule analysis and support other project planning activities, and 5) document applications of AEDC-STD-SE-1 process (tailoring).  Design reviews and audits will be identified as well as members of design review team.

2.2.6. Conduct Planning Review.  The planning review is intended to ensure the SEA is complete and meets the approach described in AEDC-STD-SE-1.  All relevant documentation shall be reviewed.  The approval authority that the project is ready to proceed is defined in AEDC-STD-SE-1.

2.2.7. Requirements Analysis.  The purpose of a thorough requirements analysis and review is to ensure that the capability owners, the contractor and the government program manager all hold a common view of the requirements.  The risk at this point can be high, because misunderstandings and errors regarding system-level requirements will flow down to subsequent designs and can eventually result in overruns and even program failure.  A requirements gap analysis will be developed to identify unmet needs.

2.2.8. Develop Baseline Concept.  During this stage, system architecture definition will be baselined and key technologies will be demonstrated in order to ensure that technical and cost risks are understood and are at acceptable levels.

2.2.9. System Functional Requirements Review.  After the baseline concept definition is complete a preferred system concept is identified.  The associated draft system work breakdown structure, preliminary functional baseline, and draft system specification are reviewed to determine feasibility and risk. Technology dependencies are reviewed to ascertain the level of technology risk associated with the proposed concepts. This review is conducted to verify that the preferred system concept provides a cost-effective, operationally-effective, and suitable solution to identified needs; meets established affordability criteria; and can be developed to provide a timely solution to the need at an acceptable level of risk.

2.2.10. Develop Technical Documents.  The Project Planning Team  will also plan for technical documentation and configuration management.  The technical documentation required in SE-1 for SRR documents shall be prepared prior to completion of planning and the start of the execution phase of project work.  The requirements document(s) and the project plan shall be consistent and complement each other.  Technical documentation that defines the physical and functional characteristics of configuration items included in the scope of the project shall be placed under configuration management and maintained throughout the life-cycle of the Configuration Items until disposal.  Asset linked configuration documentation shall be released into the AEDC Configuration Status Accounting system per AEDC-STD-CM-1

2.2.11. Validate/Approve Plan And Technical Documentation.  Once the Project Plan and the Technical Documentation are completed, both documents shall be reviewed and approved by the government program manager, asset owner or manager, capability owner, and others as identified during planning.  As with the need, this coordination and approval is a contractor investment planning system process.  The Project Plan shall be focused on work to be performed and will be maintained complete and accurate as noted in AEDCI 63-200 until project completion.

2.2.12. System Requirements Review (SRR).  The SRR is intended to confirm that the users' requirements have been translated into system specific technical requirements; that critical technologies are identified and required technology demonstrations are planned; and that risks are well understood and mitigation plans are in place.  The system specification is verified to reflect the operational requirements.  All relevant

documentation shall be reviewed.  The approval authority that the project is ready to proceed to execution is defined in SE-1.  The contractor will normally use the occasion of the system requirements review early in this stage to set the functional baseline that will govern the flow-down of requirements to lower level items as preliminary designs.

2.2.13. To Shelf Awaiting Funds.  If funding for execution cannot be obtained the project will be sent to shelf awaiting funding.  Approved baseline documentation will reside in the operating contractor's investment planning system.  Since technical documentation is linked to assets in the Configuration Status Accounting system, asset managers will be able to readily identify and understand the current existing configuration as well as potentially multiple proposed changes.  The process identified in AEDCI 99-15 again provides the decision to proceed with project execution.

**3.  Metrics.**

3.1.  Need to Capability Requirement.

3.1.1.  Cycle time from submittal to validation.

3.1.2.  Quality of information supplied given checklist, see **Attachment 2.**

3.2.  Project Plan.

3.2.1.  Earned Value Management technique will be used to measure the value of work performed in planning against planning milestones.

3.2.2.  For a checklist audit of the quality, accuracy, and completeness of the project plan, see Attachment 2.

3.3.  Improvement.

3.3.1. During project execution, changes to baseline project plans shall be tracked to identify areas of improvement, as well as the quality of the project plans and project planning effort.

3.3.2. During project execution, changes to baseline technical documentation shall be tracked to identify areas of improvement, as well as the quality of the requirements documentation process and project planning effort.

**4. Flowchart.**  See **Attachment 2**.  The planning process as defined in this instruction includes Need Development, Investment Pre-Planning, and Investment Planning.

**5.  Records.**

**Table 1.  Records**

| Required Quality Record | Custodian | Location of the Record |
|---|---|---|
| Need/Capability Requirement | Description, justification, impact statement, required completion date, rough order of magnitude cost, proponent, planning cost estimate | Contractor investment planning system |
| Project Plan | System Engineering Approach, Acquisition Strategy, Financial Plan, Need, Risk Assessment, Diagrams of the Asset and Process, Operations and Maintenance information, Check-out and Test planning and Schedule | Contractor investment planning system |

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Commander

**Attachment 1**

**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION**

*References*

AEDC-STD-SE-1, *Systems Engineering.*

AEDC-STD-CM-1, *Configuration Management.*

AEDC-STD-T-3, *Drawing Practices.*

AEDC-STD-T-4, *Specification Practices.*

AEDCI 63-200, *Investment Program Management,* 15 Jan 2008

AEDCI 63-300, *Systems Engineering and Configuration Management,* 14 Jan 2008.

AEDCI 90-700, *Capability Analysis and Risk Assessment.* 10 Jul 2012

AFMC INSTRUCTION 65-201*, Cost Estimate Documentation,* 30 Jan 2012

Mission Support Contractor Performance Work Statement (PWS)

Safety, Health and Environmental Standard A4, *System Safety,* 8 May 2012

*Adopted Forms*

DD Form 1391 *Military Construction Project Data*

AF847, *Recommendation for Change of Publication*

*Abbreviations and Acronyms*

**650 TESS**—650th Test Systems Squadron

**651 TESS**—651st Test Systems Squadron

**704 CES**—704th Civil Engineering Squadron

**AEDC/XP**—AEDC Plans & Programs Directorate

**AFMC**—Air Force Materiel Command

**704 MSG**—704th Mission Support Group

**704 MXG**—704th Maintenance Group

**704 MXS**—704th Maintenance Squadron

**704 TESG**—704th Test Systems Group

**704 TG**—704th Test Group

**AEDC**—Arnold Engineering Development Complex

**AEDC/CC**—AEDC Commander

**AEDC/FM**—AEDC Comptroller Directorate

**AEDC**—STD - SE-1

*Terms*

**Asset**— Refers to a component, system, or configuration item as defined by AEDC-STD-SE-1 and managed by AEDC-STD-CM-1, *Configuration Management*. Assets are real property of AEDC and managed by 704 MXG**.**

**CA**— Change Agreement:  Formal Process in the contractor's investment planning system that results in a deviation from the CPMP.

**Capability**— Operational role or function performed by a system or CI to realize a product or need fulfilling defined requirements for that product or need.

**CDRL**— Contractor Data Requirements List

**Change**— Refers to a deviation from the CPMP that requires adding, subtracting or reallocating project funding or a schedule shift driven by circumstances outside of project control or by decisions by the project team that effect the future of the project i.e. design changes etc.

**CI**— Configuration Item, or aggregation of systems capable of satisfying a function and identified for separate configuration management under AEDC-STD-CM-1

**Component**— Subassembly, assembly, or other major element of a CI as defined by

**Contract Revision**—  Current project budget authority as  established by  AEDC/FM  and PK through the operations contract; will change throughout the execution year as rev n, n+1, n+2, etc. Test Systems Acquisition contract revisions are worked / coordinated with 704TESG/OM.

**CPMP**—  Comprehensive Project Management Plan

**CSSR**—  Cost, Schedule, Status Report. These reports capture important information about a project's execution.

**CTEIP**—  Central Test and Evaluation Investment Program

**I&M**—  Improvement and Modernization

**Investment Product**—  New or improved asset delivering Right Capability.

**Investment Requirement**—  Deficient characteristic of a capability needed to achieve specific objectives under specific conditions.

**KPI**—  Key Performance Indicator:  A type of metric, or measurement tool used to rate performance on an award-fee type contract.

**M&R**—  Maintenance and Repair

**MILCON**—  Military Construction

**PMB**—  Performance Measurement Baseline:  Budgeted Cost of work Scheduled (BCWS) for purpose of earned value management.  The PMB is output into configuration control and may consist of revisions throughout the execution year.  Revisions to the PMB are forward looking only and do not revise past month's BCWS. Totally independent of current contract revision.

**POM**—  Program Objective Memorandum

**PPBE**—  Planning, Programming, Budgeting Execution System

**Right Capability**—  Capability to support AEDC's strategic objective most effectively.

**RDT&E**— Research, Development, Test and Evaluation

**Scope Change**— Addition or deletion of deliverables, approved change in requirements that requires a change in schedule and resources. Designating "scope change" on the CA form will result in greater approval authority in the contractor's investment planning system routing for that CA.

**System**— Aggregation of components capable of performing or supporting an operational role.
**TIPP** – Test Investment Planning Process

**Attachment 2**

**FLOW CHART**

**Figure A2.1.  Flow Chart**
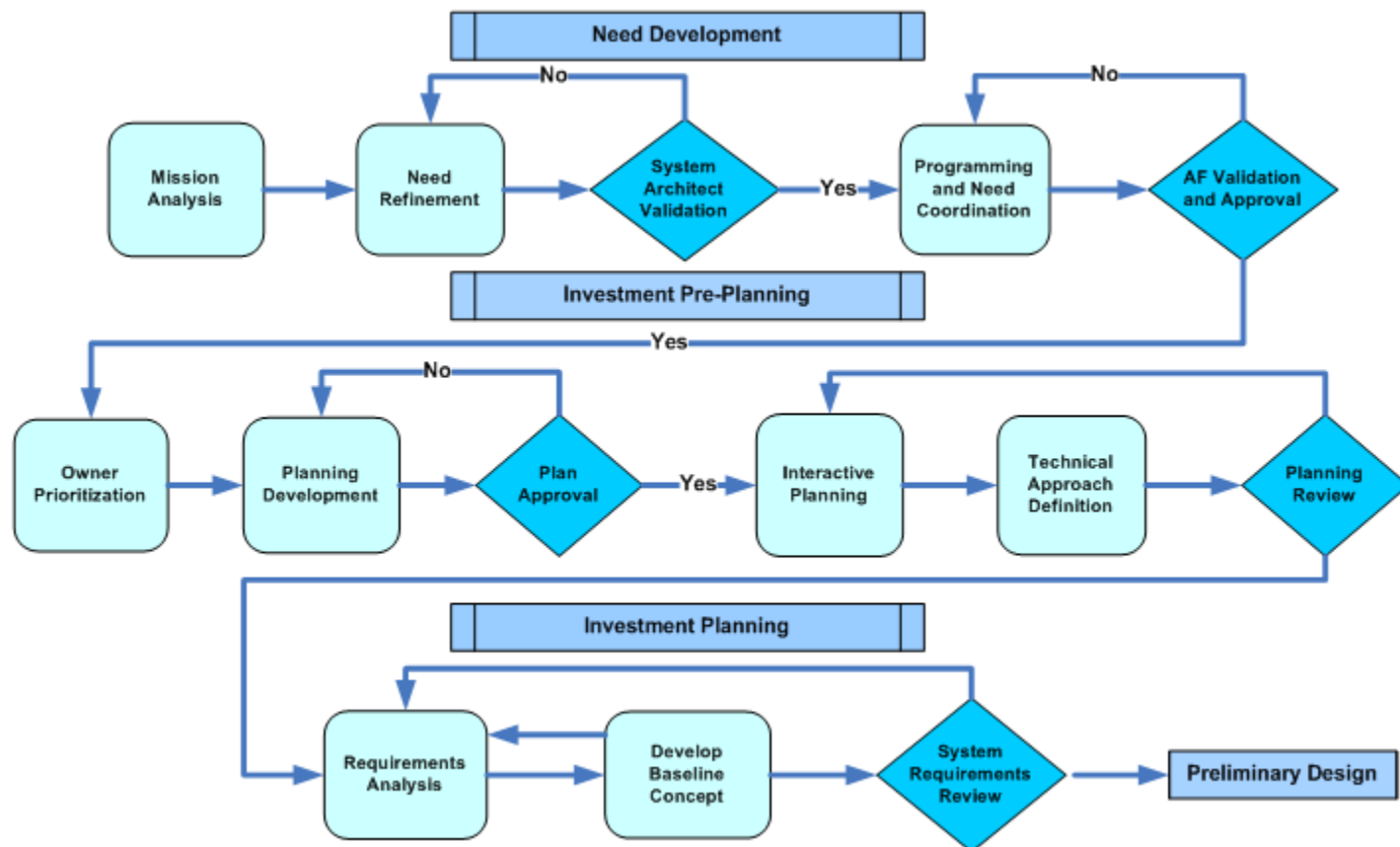
**Attachment 3**

**PROJECT PLANNING CHECKLIST**

**Figure A3.1.  Project Planning Checklist**

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**1. Identify Need**:  Has the need been described to provide answers to the following questions?

a)  Who is requesting the work be performed, who owns the assets, what mission area(s) are responsible?

b)  What is the scope of work?  What systems or assets are involved? What is the outcome?

c)  When is the work to be completed?  What is the basis of this requirement?

d)  Where will the work be performed?

e)   Why should this work be performed?   What is the justification?   Impact if not completed?

**2. Integrate Need**:  Has this need been compared to other needs that are on-going or planned for the same system area to develop an approach to maximize efficiency and effectiveness in execution and minimize duplication or waste in effort and resources.  Check schedule if an outage is projected.

**3. Validate Need – Capability Requirement:** Gain Government resource sponsor approval to proceed with planning and coordinate with customer to make sure the need is accurately documented.   Have capability owners, asset managers, and other advocates approved the developed need and is it now a capability requirement?

**4. Develop Capability Requirement Executable Project Plan:**  Plan for:

a)  Organization

b)  Financial management, cost estimates, and economic analysis including O&S funding savings/increase from this project

c)  Schedule with milestones, submit an outage request in Synergen.

d)  Design reviews and audits, configuration management, work breakdown structure

e)  Acquisition (strategy)

f)  Skills and resources

g)  Deliverables, safety hazard analysis

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h)  Security, environmental concerns

i)  Check-out test and evaluation i.e. turning over the project results to operators, maintainers, and those performing support functions, test and verification, training, photographic records

j)  software-computer-communications, facility work

**5. Define Requirements:**  Determine the System Engineering Approach (configuration change or new system) based on the nature of the need i.e. repair, replacement, modernization, improvement or new system and capability effort.  Determine operational, maintenance and supportability requirements.   Develop Operational (System) Requirements Document.

*Note:  If SRD/System Spec has been baseline released, then reference existing Functional Configuration Identification*

**6. Validate Requirements and Coordinate Plan:**  Coordinate the draft Project Plan and Requirements Document to the project team: capability owner, customer, operator or maintainers, support (Safety, Environmental, Logistics, Security, Facilities), asset owners, system architects, designers, analysts, project management, procurement, and legal.

**7. Program & Prioritize**:   Include as CARA capability requirement and complete DD Form 1391 or additional documentation required by customers such as CTEIP, TIPP, etc or performers such as the Corps of Engineers

**8. Baseline Planned Project**:

Project Plan with Capability Requirement in Matrix and IRL/UR list

Requirements documented in Matrix Configuration Status Accounting System

Documentation reflecting project team's approval to proceed

CARA Programming, Economic Analysis and other supporting data in project folder